TECHNICAL GUIDANCE COMMITTEE
FOR INDIVIDUAL AND SUBSURFACE SEWAGE DISPOSAL

December 4, 2001 MEETING MINUTES

PRESENT: Joe Canning, P.E., B&A Engineers
Rex Browning, Licensed Installer
Barry Burnell, EHS - DEQ
Dan Kriz, Environmental Health Director, SCDHD
Ken Babin, Supervisory EHS, PHD
Mike Reno, EHS – CDHD

GUESTS: Jim Nichols, Infiltrator Systems Inc.
John Robinson, Infiltrator Systems Inc.
Michael Lloyd, Ring/EZ Flow
Chris Duryea, Infiltrator Systems Inc.
Bill Morgan, Infiltrator Systems Inc.
Jeff Fereday, Infiltrator Systems Inc./Givens Pursley
Alex Mauck, EZ Drain
Cory Russell, Advanced Drainage Systems

The meeting was called to order at 8:35 a.m., December 4, 2001. The coordinator provided a brief reminder to the guests of the purpose of the Technical Guidance Committee meeting and asked each individual to introduce themselves to the committee. The guests were asked to sign the sign-in sheet, and indicate if they were interested in presenting to the committee.

May 14, 2001 TGC minutes - review, amend, and accept.

Ken Babin suggested an amendment to the minutes. Mike Reno moved that the committee accept the minutes as amended. Rex Browning seconded the motion, and the committee voted in favor of accepting the 05/14/2001 TGC minutes as final. **See Appendix A**.

TGC Preliminary Approval Review for Final Approval
A. TGC Revision - Septic Tank Construction Structural Reinforcement Specifications.
The committee discussed the preliminary approval to modify the septic tank structural reinforcement language in the TGM page 23. Lar-Ken has poured several tanks using the 1-½ inch polyethylene fibers as replacement to steel reinforcement. Pocatello Precast is using fiber reinforcement as well, but not as a substitute for steel reinforcement. The preliminary approval language was read:

> Reinforcing steel shall be ASTM A-615 Grade 60, fy=60,000 psi, details and placement shall be in accordance with ACI 315 and ACI 318 <u>or equivalent as certified by a licensed structural engineer.</u>

Ken Babin moved to accept for final approval the revised structural reinforcement language as presented in the TGM page 23 section 2.b. Joe Canning seconded the motion, and the committee voted in favor of **final approval**. **See Appendix B** TGM page 23.

DEQ Update on Sizing Gravelless Trench Components

A. Public Comments Package Review.

The coordinator handed out copies of the public comments package to the TGC members, the Infiltrator Systems representative, EZ Flow representative, Jeff Fereday, and ADS representative. The coordinator presented a brief summary of the six public comments received. The comments received were:

1. Health District reports on system failures,
2. Bob Backman letter,
3. Chris DiTullio, Cultec Inc. letter,
4. Dick Bachelder, PSA, Inc. letter,
5. Michael Lloyd, EZ Flow E-mail and attachment, and
6. Jeffrey Fereday, letter with Infiltrator attachments 1, 2, and 3.

B. DEQ Draft Proposed Gravelless Trench Sizing Method.

The coordinator handed out a draft proposed gravelless trench sizing paper, and presented the proposal to the TGC. (**See Appendix C**) The committee discussed the proposed sizing approach.

C. Presentations by Manufacturers.

Jim Nichols (Infiltrator Systems Inc.) and Michael Lloyd (EZ Flow) were each given 30 minutes to present information to the TGC for their consideration.

1. Jim Nichols, Infiltrator Systems Inc. Supports the use of infiltrative area and storage volume as two factors in sizing drainfields. Infiltrator recognizes that gravel drainfields are the standard system in Idaho. Mr. Nichols presented his interpretation of how Darcy's Law should be applied to drainfield systems. Mr. Nichols presented the findings of Dr. Robert Siegrist, Colorado School of Mines. Mr. Nichols presented that in Darcy's Law the variable studied in Siegrist's work was area. Area was the variable in the study based on preparing half of the test columns with gravel and the other half without gravel. Construction details of the columns used in the study were presented along with findings. It was reported that Siegrist's work demonstrates that columns without stone had higher flow rates by 2.4 times or equivalent to a 41% reduction in drainfield size. Mr. Nichols presented that no fines were used in this study, but that the first layer of gravel in the columns was covered by sand to simulate gravel dropped into a trench. Mr. Nichols noted that fines form a restrictive layer. Next Mr. Nichols presented a suggested sizing for a gravel drainfield. His demonstration used a 3-foot wide, 10-inch high trench for 56 inches or 4.67 ft^2 of infiltrative area. Using Siegrist's flow rate of 41%, the stone trench is given 1.91 ft^2/ft of area (4.67 $ft^2/ft \times 0.41 = 1.91\ ft^2/ft$). Comparing this to the drainfield sizing of 3 ft^2/ft results in a sizing factor that can be applied to all alternative systems. 3ft^2/ft divided by 1.91 ft^2/ft results in a sizing factor of 1.57. This figure is recommended to be used along with system open area to determine application area.

Storage is recommended to be a secondary factor. The suggestion was to first compare infiltrative surface area, and if the surface areas are equal to or better than stone then look at storage area. If storage area is lower than stone then the committee should add more length to the system.

A question and answer period was held with the committee regarding Mr. Nichols' presentation. Mr. Nichols agreed to provide to the committee the open area on the side of the Infiltrator Products. Problems with installations in sandy soils were discussed. Mr. Nichols indicated that the company has a required minimum number of infiltrator standard units to be installed in sand or to use the EQ 36 product in order to take advantage of the higher louver height. Mr. Nichols was asked about installations of infiltrator products on ASTM-C-33 medium sand. The reply was to moderately compact the medium sand fill to prevent chambers from settling into the sand. Rex Browning provided examples of systems that he has installed. Mike Reno asked which states provide a reduction, what percentage reduction is granted, and for which products. Mr. Nichols agreed to provide to the committee the requested information.

2. Michael Lloyd, EZ Flow – Ring Industrial Group. Clarified that the National Onsite Advisory Board (NOAB) consists of Dr. Larry West (soil scientist, University of Georgia), Dr. Robert Rubin, (environmentalist, NC State University), and Dr. Kevin White (Civil Engineering, University of South Alabama) this group of scientists were not paid by Ring Industrial Group. The paper that was prepared was based on their research, and was a copy of material submitted to Georgia. Mr. Lloyd stated that the purpose of the drainfield was to provide infiltrative area, storage of septic tank effluent during periods when wastewater flow exceeds infiltration rates, and to support the overlying soil. Mr. Lloyd presented the soil principals in Darcy's Law. Hydraulic conductivity (K) is the measure of resistance R=l/k, with l being thickness. The variable that determines flow through soil is the resistance or the sum of the hydraulic conductivities. I and A are kept constant in Darcy's Law, with K being the variable. Reference was made to the hydraulic conductivity paper (public comment #5). Mr. Lloyd indicated that the fines in a system with a biomat developed would control the flow rate into the soils. If the fines are removed, then the flow rate increases by 30-60%. Mr. Lloyd asked that the committee look at all of the sciences, and if you remove the fines, then there is no masking. Q is the same in column studies without the addition of fines. The K of the biomat layers is the factor determining infiltration rate into the soils.

The NOAB sizing looks at all three infiltrative surfaces, the bottom area has an infiltration rate of 50% because of the hydraulic conductivity of the fines biomat, the two sidewall areas have infiltration rates at 75% as a margin of safety. Applying this sizing to a standard 3 foot wide gravel drainfield results in a bottom infiltrative area of 3 ft^2/ft x 0.50 = 1.5 ft^2/ft, and a side wall area of 2 x 1ft^2/ft x 0.75 = 1.5 ft^2/ft for a total of 3.0 ft^2/ft. Applying this approach to 12-inch diameter tube the approach is to use the circumference of the tube as the infiltrative surface area or 3.1 ft^2/ft or call it 3.0 ft^2/ft. These systems do not have fines, the biomat will form at the soil, and the hydraulic conductivity will be higher than a gravel system with fines.

The committee asked Mr. Lloyd questions about his presentation. Mike Reno asked which states provide a reduction, what percentage reduction is granted, and for which products. Mr. Lloyd agreed to provide to the committee the requested information, and the NOAB presentation. The committee asked questions about biomat development with soils, fines and gravel. Mr. Lloyd indicated that the source of fines is from the gravel, and is similar to the sands used in the Siegrist study. The fines are the cause of the decrease in hydraulic conductivity. Mr. Lloyd presented information on use of storage volume. Soils have a void volume of 30%. Surge volume is used in Georgia at a rate of 1.5 times the storage volume of a gravel drainfield. Mr. Lloyd pointed out the O.D. (12") and I.D. (8") of large diameter pipe, and suggested that the louver height of domed chambers is the same as the slits in large diameter pipe.

The committee decided to limit presentations to the single thirty-minute period for each group and that any other comments could be directed to the committee in writing.

The coordinator indicated that the DEQ will go through an additional public comment period; and DEQ would decide about suggesting guidance for sizing gravelless trench systems, or if rulemaking should be initiated. Ken Babin suggested that the formula for sizing gravelless trench systems should only go to rulemaking if universal acceptance. The rationale is that rulemaking is a longer process (10 years between rule updates) to make changes should the formula need to be modified. Interim to rulemaking, the committee could adopt formula as guidance. Rex Browning suggested that each company prepare a sizing formula and apply it to the gravelless trench products. The committee discussed the public comment period, and agreed to keep the comment period short. The committee recommended to DEQ to have a 45-day comment period, after which time the DEQ would review comments and reconvene the committee shortly thereafter.

Jeff Feredey pointed out that, in his opinion, if the DEQ decides that the sizing formula should go through rulemaking that it would be inappropriate for the committee to adopt an interim sizing formula. Joe Canning concerned that with the sizing formula proposed by DEQ, awards too much credit for storage volume. Joe Canning suggested that storage volume greater than 1.5 times the daily flow should be the maximum, and anything above this should not be awarded additional credit. Rex Browning encouraged the DEQ to consider the function of stone supporting pipe and sidewall as a component to sizing.

The committee recommends to DEQ to initiate a 45-day public comment period on the proposed draft gravelless trench sizing; for DEQ to review the submitted information, and to decide if rulemaking or guidance is appropriate, and to reconvene the committee before the next construction season.

Product Reviews

1. ADS Multipipe 9 and 11. The coordinator informed the committee that DEQ did not accept the approval issued for ADS Multipipe 9 and 11 based on the sizing using the originally proposed sizing method.

The committee was given a packet of information from the ADS company requesting approval for use in Idaho of the Bio2 and Bio3 products. The committee reviewed the information submitted by ADS for their Bio2 and Bio3 products. These chamber designs are similar to infiltrator EQ24 and EQ 36. Mr. Nichols informed the committee that the Bio2 and Bio3 have less open surface area on the sidewalls and have some minor structural differences. The committee discussed the previous sizing method for domed chambers. Mike Reno moved that the committee accept the Bio2 and Bio3 as approved products using the current sizing as being equal to 2 and 3 foot wide trenches respectively. Joe Canning seconded the motion and the committee voted in favor of granting product approval. The suggestion was to notify ADS on the sizing issue. The company through Dick Bachelder has submitted comments on the proposed gravelless trench component sizing.

The committee reviewed the ADS Multipipe 9 and 11 products in relation to existing products of the exact same size, shape, and capacity. Ken Babin moved to accept the ADS Multipipe 9 and 11 based on existing sizing factors. Joe Canning seconded the motion and the committee voted in favor of granting product approval.

2. EZ Drain Company Sizing for various product configurations. The committee was given a packet of information from EZ Drain Company requesting approval of various product configurations for use in Idaho. EZ Flow/Drain Company withdrew their request for committee approval of the different product configurations due to the suggested sizing being based on the rejected sizing method.

3. SimTech Bristle Filter. The committee was given a packet of information from the company requesting approval for use in Idaho as an effluent filter. The committee discussed effluent filter approvals, and reviewed the previous requirements established for effluent filter approval. The committee has previously approved effluent filter if they have passed the NSF Standard 46 protocol. Effluent filter manufacturers, approved prior to NSF adopting Standard 46, were given three years to achieve certification by the committee. The committee decided not to approve the SimTech Bristle Filter until such time that the company completes NSF standard 46 testing.

The committee adjourned for lunch.

The committee reconvened the meeting at 1:10 pm.

Product Reviews (continued)

4. EcoFlo video was viewed. The EcoFlo system is a peat filter placed over an absorption bed. The peat provides a medium for effluent treatment prior to absorption into the soils below the systems. The peat is replaced every eight years. The committee had a concern over disposal of the spent peat materials. The video was provided for informational purposes only, as no request for approval has been received.

TGC Updates (from May 14, 2001 meeting)

The committee reviewed the final approvals from the May 14, 2001 meeting (**see Appendix D**). The coordinator presented to the committee the following TGM pages:

Policy # 2000-1	Page 139-1
Policy # 2000-2	Page 139-2
Pipe Materials	Page 78-6, and Page 22
Effluent Filter Design	Page 58
Fill Material	Page 16
Soil Design Subgroup Corrections	Page 9
Unstable Landforms	Page 18-6 and 18-7
Drainfields	Page 24
General Requirements	Page 27
O&M requirements	Page 29
Extended treatment package systems	Page 39
Lagoons Inspection	Page 46
Pump Vaults	Page 59-1

A suggestion was made that the committee three hole punch these pages and insert them into their TGMs. The Health District and DEQ regional offices will be sent a copy of the updates to be distributed to their staff. The next planned update for the TGM is April 2002.

Mike Reno discussed the fill material section. A concern was raised that this section would be used to modify sites that are seasonally flooded. The committee indicated that use of the fill material section of the TGM is not an appropriate method to use on sites that are seasonally flooded. These locations may be in flood plains and may have U.S. Army Corp of Engineers (USACE) jurisdictional issues regarding the filling of wetlands. Any fill on a wetland may require Clean Water Act Section 404 permits. Applicants should be directed to the USACE for fill proposals on wetlands. It was pointed out that site modifications under this section do not guarantee that SSDS permits will be issued.

O&M Corporation Documents

1. Capital Extended Treatment Inc. The coordinator had provided to the committee Capital Extended Treatment Inc. O&M documents, and asked if the committee had any review comments. The AG's office has provided review comments, and the coordinator has reviewed the septic tank design plans and found them to be inadequate.

The committee discussed the installation of extended treatment package systems in relation to installations for sand mounds, ISFs and RGFs. The committee recognizes that the biggest challenge for O&M companies will be the transition from the current board of directors to new board when the individuals retire from installation and service. The committee looked at a best and a worst case scenario for transition, and discussed the pros and cons of extended treatment package systems.

The committee also discussed current problems with extended treatment package systems O&M entities. Tracking and following up on problems, sampling systems, and annual O&M reporting. The coordinator offered to issue a letter to the O&M entities reminding them of their annual O&M reporting obligation.

2. O&M Corporation New Item #26. The AG's office recommended that the committee should go through the rulemaking process to add a new item to the list of O&M entity requirements. The committee discussed the various approaches O&M entities have used to enter into service agreements. In one case, an individual signed the service agreement contract as both the O&M director and as the service provider. Some entities have used family members, sons or brothers, to sign the service agreement. The committee decided that this issue did not warrant the rulemaking process, and decided to drop adding a new item to the list of requirements.

Proposed Rules Development

Reasonable Access to the Central Wastewater Facilities (58.01.03.005.05.e). The coordinator presented to the committee a handout composed of the following items: letters DEQ issued to District 7; a District 7 letter to the coordinator; the Valley Advocates for Responsible Development Appeal; a draft DEQ WebPages announcement; a draft DEQ letter requesting public comments; and a spreadsheet outlining proposed factors to consider when making reasonable access determinations. The coordinator explained the issues in Teton County, how the appeal was filed, and the actions DEQ and the AGs office is taking to have the appeal withdrawn. The committee discussed examples of when the health districts have made reasonable access determinations, and the flexibility the current language offers staff in making access determination decisions. The language was intended to be vague so that the various factors could be used in making a decision. The committee recommends to the DEQ to leave the language as it is written so that the Director or his designee can make the decisions. Examples of annexation, city property boundaries, development housing density, and land use planning decisions are all factors that affect when a sewer service is available. Environmental considerations need to be the main focus of reasonable access decision-making. Ground water quality rule and water quality concerns need to be primary considerations. DEQ should comment on P&Z documents, but land use planning needs to remain a local issue. DEQ should not make this a statewide issue.

The committee reviewed the VARD appeal and the draft spreadsheet of conditions to consider when reviewing projects for reasonable access to central wastewater facilities. <u>The committee recommended that DEQ not undertake a rulemaking or develop guidance for the TGM that restricts reasonable access decision-making</u>. The committee recognizes the site-specific factors that are involved in making reasonable access decisions. The economics of land development was recognized as an issue a developer must deal with in preparing subdivision plats. The costs of development are passed on to the property owners, and the DEQ should discount economic factors in making these types of decisions and weigh more heavily on the environmental impacts. <u>The committee also recommended that low interest loans for wastewater transmission lines should come with conditions that address land development conditions and connecting into the system being financed with SRF loans</u>.

The coordinator reported to the committee that it does not qualify as a rulemaking body. DEQ will have to go through the APA process of setting up a rule making committee. DEQ would use the committee's recommendation as a draft rule to present to the rule making committee. Members of the TGC could also serve as members of the rule making committee.

New System Development

A. Graywater System Re-review. The coordinator presented to the committee the proposed graywater system for re-review. The committee discussed the proposed graywater system and the added interest in using these types of systems for water reuse. The committee reviewed the proposal and asked that the UPC holding tank information be added. The committee also discussed mini-leach fields and pump systems. Joe Canning moved that the committee grant preliminary approval of the revised graywater system. Dan Kriz seconded the motion and the committee voted in favor of granting **preliminary approval** for the graywater system. **See Appendix E**.

B. Constructed Wetland Update. No progress on the constructed wetland demonstration project. The state has some funding to install two experimental constructed wetlands and to conduct sampling of the influent and effluent from each wetland.

C. Drip Irrigation Working Session. The coordinator provided to the committee a draft drip distribution system handout. The drip lines are pressurized with effluent from the septic tank after passing through specially designed filtration systems. Typical components include a septic tank, pump tank with dosing pump, flushable 100-micron disk filter, flow meter, programmable logic controller, and a network of shallow drip distribution lines. The committee reviewed the literature summaries and viewed an installation video. The Mineral Mountain Rest Area on Highway 95 is having system problems and ITD planners are considering the use of drip distribution. The committee reviewed and amended the draft drip distribution system. Joe Canning moved to grant preliminary approval of the amended drip distribution system. Dan Kriz seconded the motion, and the committee voted in favor of granting **preliminary approval** for the drip distribution system. **See Appendix E**

Issues from the field

A. NSFC Database. The National Small Flows Clearinghouse (NSFC) maintains six databases that provide information about all aspects of sewage treatment. Two of these databases can now be searched online at http://www.nesc.wvu.edu/nsfc/nsfc_databases.htm : the Bibliographic and Manufacturers and Consultants Databases. The Bibliographic Database stores thousands of articles dealing with onsite and small community wastewater collection, treatment, disposal, and related topics. The articles are collected from more than 90 journals and magazines, as well as conference proceedings, U.S. Environmental Protection Agency (EPA) documents, and research papers. The Manufacturers and Consultants Database houses a list of industry contacts for wastewater products and consulting services. This database serves both as a reference for engineers, private citizens, and small community officials and a referral database for wastewater products and trade items.

B. Permitting Extended Treatment Package Systems (ATUs). A letter from Panhandle District Health was shared with the TGC and asked for guidance from the TGC on writing permits for extended treatment package systems. The difficulty is getting the signed and recorded membership agreement and easement from the applicants. The issue stems from writing permits with options for systems that can be installed. During the site evaluation it is common for the permit to be issued for ATUs, ISFs, or RGFs. Builders are also making applications for on-site systems and if the choice is to go with an ATU the builder cannot not sign the membership agreement and easement documents for the property owner. Builders that are speculating on selling a property and own the property, may sign the agreements and have them recorded, as they are the property owner at the time the documents are recorded.

The committee recommends the following process for issuing septic system permits.

1. Conduct the onsite evaluation.
2. Inform the property owner by letter or onsite report of the findings of the onsite evaluation. Indicate in the report which systems a permit may be issued.
3. Property owner selects option to be installed, has plans and specifications prepared (sand mounds, ISFs, RGFs), signs and records membership agreement (ATUs) and easement documents.
4. Property owner submits a completed application for a septic system.
5. Health district issues a permit after all elements of the application have been submitted.

Note sections 58.01.03.005.04. h, l, and o (TGM pages 105-106) require the property owner to:
h.) Submit plans and specifications of the proposed system,
l.) Provide copies of legal documents relating to access (easements) and to the responsibilities for operation, maintenance, and monitoring (O&M membership agreement), and
o.) Any other information, document, of condition that may be required to substantiate that the proposed system will comply with applicable regulations.

C. Abandoned Systems. The question from the field is for assistance in interpreting the abandoned system. Page 98 of the TGM defines abandoned system to be a system which has ceased to receive blackwaste or wastewater due to diversion of those wastes to another treatment system or due to termination of waste flow. The TGM interprets this definition at page 30 of the TGM. An abandoned system is considered to be a system that has not received wastewater flows or blackwaste for one year or more. The PHD has been advised that they cannot deny an occupancy permit for a structure that is replacing the same use and same size. The issue is non-conforming systems that are abandoned, and reissuance of permits for new construction. Element #4 of the guidance instructs the applicants that if the system is an unapproved system, it must be uncovered, pumped and inspected. It must meet all the current requirements, including issuing of a new permit. The committee instructs the health districts to follow these guidelines.

D. Easements and Monumenting Corners. The concern expressed is that “monumenting” corners of easements is too expensive for the applicants, and that simple staking and surveying (describing) the corners should be sufficient. The committee turned to Joe Canning for his opinion of easement work. The TGM (pg 30-1) informs the applicant that the easement is to be surveyed and recorded (item 3), and a survey, including monumenting the corners of the proposed easement site shall be made to supply an accurate legal description of the easement (item 5). The committee’s intention was to establish a legal process to identify easement locations. The process needs to be repeatable, and the corners of easements marked sufficient enough to avoid problems when properties change hands. The concern is when property is sold, and the new owners are not supportive of the easements, previous land-owners had entered into, that the monumented corners may need to be surveyed (described) so that they can be relocated in case they are removed. The committee discussed monumenting as physical evidence of a corner, and surveying as defining and setting land boundaries for the purpose of property sales. Joe Canning was given the assignment to look up the practice of surveying, and monumenting as defined in Idaho Code or the rules for land surveyors, and to report back to the committee. Item number 5 of the Easement section of the TGM may need to be revised[BB1].

E. Travel Trailer Wastewater Flow. Wastewater flow rates from travel trailers (125 GPD TGM pg 114) is being questioned and clarification is asked as to the TGC’s recommendation on wastewater flows. Various flow rates are being submitted for travel trailers. The coordinator reported that a comparison was completed of various wastewater texts estimates and metered flows. The following table lists by source the recommended wastewater flow rates in GPD.

Source	Wastewater Flow Estimates (GPD)
IDAPA 58.01.03.007	125
EPA 1977 (est)	150/trailer 50-150 central bathhouse per site
EPA 1980 (est)	32 gal/per/day campground
Metcalf & Eddy, 1991 (est)	75-150 (2.5 people) 125 ave. per trailer 30 gal/person/day campground
Manual of Septic Tank Practices (est)	50/space w/o sewer and water 100/space w/ sewer and water
Goldstein, 1973 (est)	50 gal/capita/day
Americana Campground (1994 metered)	50/unit discharge is to central sewer
Atlasta RV Park (1994 metered)	220 discharge is to central sewer
On The River RV Park (1994 metered)	85 discharge is to central sewer
Hi Valley RV Park (1994 by design)	40 gal/person discharge is to central sewer

Travel trailer park on-site system should be sized at 85 GPD per travel trailer with full water and sewer connections. If there is a strong likelihood that the park will be used for year round residences (Atlasta RV Park) then the higher flows should be used.

F. Bonding. An installer requested consideration of secured bank accounts or escrow accounts co-signed by the health districts as opposed to bonding. The installer making the request had his bond cancelled. The AG’s office reviewed this issue and concluded that the rules requiring bonding and that no other option is available. The committee was not interested in developing a proposed rule allowing an alternative to bonding.

The committee did not have time to develop a policy on Total Nitrogen Reduction for alternative systems. This agenda item is held over for the next meeting.

The committee adjourned at 5:00 p.m.

APPENIDIX A

Final TGC Minutes
May 14, 2001

TECHNICAL GUIDANCE COMMITTEE
FOR INDIVIDUAL AND SUBSURFACE SEWAGE DISPOSAL

MAY 14, 2001 MEETING MINUTES

PRESENT: Joe Canning, P.E., B&A Engineers
Rex Browning, Licensed Installer
Barry Burnell, EHS - DEQ
Dan Kriz, Environmental Health Director, SCDHD
Ken Babin, Supervisory EHS, PHD
Mike Reno, EHS – CDHD

GUESTS: Alex Mauck
Chris Duryea

This meetings agenda and informational topics were tracked using a PowerPoint presentation.

November 21, 2000 TGC minutes - review, amend, accept.

Ken Babin pointed out several areas to be amended and moved that the committee accept the minutes as amended. Joe Canning seconded the motion and the committee voted in favor of accepting the 11/21/2000 TGC minutes as final. See Appendix A.

TGC Preliminary Approvals Review for Final Approval

A. TGC Draft Policies #2000-1, #2000-2.

The Committee reviewed the two proposed policies. Policy number 2000-1 needs to reflect the revised total nitrogen loading and associated 40% reduction. The total nitrogen level in the policy will be changed from 24 mg/l to 27 mg/l. A second issue is the applicability of the policy. The Committee discussed the applicability and revised the policy to add an applicability statement. "This policy applies to extended treatment package system permits issued prior to November 21, 2000."

Discussion was held as to where in the TGM this section would be placed. The consensus was to add a new section to the TGM titled Policies and to place that section between the Rules and Idaho Code sections. The policy section is to explain to readers the interpretations that the TGC has made of the rules. It provides a spot for the TGC to provide direction to the health districts for implementing the TGM. Ken Babin moved to accept for final approval the revised policy #2000-1 and Dan Kriz seconded the motion. The committee voted in favor of **final approval**.

Policy number 2000-2 Installer Classes and Examinations. Discussion was held on updating the installer examinations based on latest information, when the rules are changed or every 5-10 years to reflect the changes made in the TGM. The direction the committee provided to DEQ was to revise the installer examinations when the rules are updated and every 5 years to reflect changes in the TGM. Mike Reno moved to approve Policy # 2000-2 and Rex Browning seconded the motion. The committee voted in favor of **final approval**. See Appendix B for the new TGM Policy Section.

B. Sizing chart for Gravelless Trench Components

The discussion started out with a review of proposed gravelless trench sizing approach as applied to a standard 3' wide drainfield and as applied to one of the gravelless trench alternatives. The committee was provided with a copy of the excel spreadsheet that applied the proposed gravelless trench sizing approach to each of the approved gravelless trench alternatives. The committee was also provided with a copy of TGM page 78-3, the approved gravelless trench component page with the proposed gravelless trench sizing listed for each product.

The committee at the November 21, 2000 meeting had issued preliminary approval of the sizing approach. Direction provided at the 11-21-00 meeting was to amend the sizing approach for domed chamber products from the total product height to the height of the louvers. These changes were made, as well as a change to the void coefficient so that the sidewall height was not double counted.

Mr. Chris Duryea asked to make a comment, was granted permission, and pointed out to the committee that an error was made in the Gravelless Trench Components list. The listed sizing factor was different from the spreadsheet sizing factor. The committee updated the Gravelless Trench Components list using the spreadsheet.

Mr. Alex Mauck asked to make a few comments and was granted permission. Mr. Mauck commented on the need to study the proposed changes and that studies had been completed in Texas and Georgia. Mr. Mauck also commented on the sizing for large diameter pipe. The coordinator replied that the committee's intention is to develop a sizing protocol for all gravelless trench components that is equitable and predictable. The committee has the authority to recommend to DEQ sizing for the approved gravelless alternatives.

Mr. Mauck suggested that the media should be given some consideration as a treatment surface for effluent and that the soils should be given some consideration for treatment with respect to the long term acceptance rates. Ken Babin replied that the committee was considering the role storage capacity plays in system function, noting that wastewater use fluctuates by day and by week. Drainfield capacity is an important aspect of system sizing in that it accounts for storage within the system. This storage capacity is an important factor in order for the system to function during times when the wastewater rates exceed the soils infiltrative capacity.

The committee discussed the need to size various gravelless trench products using the same method and to be equitable for all products. The committee directed the coordinator to run the proposed sizing approach on the extra drainrock trench alternative and to prepare a revised extra drainrock sizing table.

The committee next discussed developing a consensus on setting an effective date for adopting the gravelless trench sizing approach. Ken Babin moved to accept the amended Gravelless Trench Components table with a 2 month lead time to notify manufacturers of the change in sizing, and for the committee to use the new sizing approach for all new product approval requests. Mike Reno seconded the motion and the committee voted in favor of **final approval**. See Appendix B.

C. Pipe Materials Page 78-6

The coordinator presented the draft Pipe Materials page 78-6 of the TGM to the committee. Joe Canning noted that not all pipe manufacturers use the same system of pipe coloration and striping for the approved standards and recommended that the Pipe Materials page be amended. The pipe coloration and striping descriptions were deleted. Ken Babin moved that the committee accept as final the amended Pipe Materials page 78-6. Joe Canning seconded the motion and the committee voted in favor of **final approval**. See Appendix B.

D. Effluent Filter Design Page 58

The coordinator presented the Effluent Filter Design Substitution, TGM page 58 to the committee. The committee held a discussion on pump screens and effluent filters. The added language is: "Effluent filter designs fitted with a closing mechanism are a suitable alternative to screens around pumps." Joe Canning moved that the committee accept for final approval TGM page 58. Dan Kriz seconded the motion and the committee voted in favor of **final approval**. See Appendix B.

E. Fill Material Page 16

The coordinator presented the revised language for the Fill Material section of the TGM page 16 to the committee. The added language is: This section is intended to provide general information for property owners to consider when filling a site and this section is not an approved alternative design." Ken Babin moved to accept for final approval TGM page 16. Joe Canning seconded the motion and the committee voted in favor of **final approval**. See Appendix B.

TGC Updates (from 11-21-00 mtg)

The committee reviewed the final approvals from the November 21, 2000 meeting. The coordinator presented to the committee the following TGM pages: page 29 revision to item #17 requiring monitoring of extended treatment package systems; page 39 revision for extended treatment package systems to monitor for BOD, TSS and Total Nitrogen; page 59-1 revision allowing the use of pump vaults in septic tanks for pressure distribution systems; and page 18-6 and 18-7 new soils section adding Unstable Landforms.

Product Reviews

A. SI Concrete Systems request for approval of fiber reinforced concrete septic tanks. The coordinator provided to the committee information from SI Concrete Systems concerning the use of fiber reinforcement for concrete septic tanks. The committee discussed the merits of using fiber reinforcement as a structural reinforcement substitute for welded wire mesh or rebar. The proposal requests approval of fiber reinforcement as a substitute for steel reinforcement in concrete septic tanks. The proposal recommends that the committee recognize this technology through full scale above ground hydrostatic testing as specified in ASTM 1227.

The committee discussed the proposal and reviewed TGM pages 22-23. The committee reviewed the current reinforcing steel language and noted that page 23 section 2. b. should be modified. The committee negotiated the language in this section to read:

> Reinforcing steel shall be ASTM A-615 Grade 60, fy=60,000 psi, details and placement shall be in accordance with ACI 315 and ACI 318 or equivalent as certified by a licensed structural engineer.

Ken Babin moved to grant preliminary approval to modify TGM page 23 section 2.b. Joe Canning seconded the motion and the committee voted in favor of **preliminary approval**. See Appendix C.

B. Zabel Environmental Technologies – Filtered Pump Vaults.
The coordinator provided to the committee information supplied by Zabel Env. Technologies requesting approval of 22 filtered pump vaults. The committee reviewed the information and directed the coordinator to send to Zabel a copy of the TGM page 59-1 pump vault requirements, and to request that Zabel provide to the committee a list of filtered pump vault products that meet the standard.

C. Advanced Drainage Systems Inc., 9-pipe and 11-pipe Multi-pipe system.
The coordinator provided to the committee information supplied by ADS requesting approval of the 9-pipe and 11-pipe Multi-Pipe System. The committee reviewed the product information. Ken Babin moved to accept the 9 and 11-pipe Multi-Pipe System and to use the revised gravelless trench component sizing protocol for the approval. Mike Reno seconded the motion and the committee voted in favor of granting product approval.

The EcoFlo video was tabled due to time problems and the committee adjourned for lunch.

O&M Corporation Documents
The coordinator provided to the committee the Dome Technologies (Effluent Technologies Inc.,) O&M documents and asked that the committee complete the review by June 14, 2001. The coordinator pointed out a problem with some maintenance agreement contracts. Contracts have been signed twice by the same individual, once as the director of the O&M entity and once as the service provider. The concern would be for a breach of contract when the service provider fails to perform according to the contract. It is extremely unlikely that the O&M entity director would bring suit against himself. As a result the coordinator presented to the committee a suggested revision to the list of items a non-profit corporation must meet in order to be issued approval to operate as an extended treatment package system O&M entity.

New Item # 26:

> "O&M entities shall contract with an independent third party service provider."

In order to ensure service is provided and contract obligations will be met the O&M entity and the service provider shall be separate. The committee directed the coordinator to review the proposed additional item with the attorney generals office and to bring back to the committee language that its acceptable to the deputy AG.

Proposed Rules Development
Wastewater Flows/Trophy Home Wastewater Flows. The coordinator presented to the committee a review of several states estimated wastewater flows from a three-bedroom home. The flows ranged from 300 GPD up to 600 GPD and the additional flow estimated per bedroom ranged from 75 GPD/person to 200 GPD/bedroom. Idaho's rules estimated flow for a three bedroom home is 250 GPD with an increase of 50 GPD/Bedroom. Idaho is underestimating wastewater flow rates from single family dwellings.

The proposed rule requires a minimum size septic tank to be 1000 gallons per dwelling with tanks for other wastewater sources to be sized at twice the average daily flow. Additionally, peak wastewater flow rates for facilities with non-uniform wastewater generation rates shall be used for design purposes unless a method of flow equalization is provided. Wastewater flow rates for single family dwellings is proposed to be 0.20 Gal/ft^2/day.

Idaho is seeing a spread in large square footage homes throughout the state. The wastewater flow from these residences is not adequately estimated by the current rules. Numerous failures of systems have been reported due to excessive water use. The benefits of revising the wastewater flow estimates based on a square footage of living space in the dwelling is that it is based on a sliding scale to address the large homes, adequately estimates flow for the smaller dwellings and is simple to apply.

Mike Reno presented to the committee an alternative approach using 300 GPD for a three bedroom dwelling and increasing the GPD for additional bedrooms from 50 to 100. This approach also keeps the 1000-gallon septic tank as the minimum size tank and reduces the tank size to 1.5 times the wastewater flow. Lastly, the proposed alternative adopts the square footage approach for dwellings greater than 6000 ft^2. The committee discussed the split rule approach and was not in favor or using two separate methods for estimating wastewater flow from single family dwellings. The committee reviewed the comments from the district health department staff and decided to stay with the proposal developed by the committee.

It was noted that Banberry subdivision has large dwellings and uses 450 GPD for 4 bedroom designs. Also smaller residences (1300 ft^2) in Kuna are being connected to city services with an anticipated flow of 220-240 GPD for a 3-bedroom home. The committee directed the coordinator to research the water usage in Island Woods (Eagle Water Co.), Banberry, and Spurwing (United Water) and to check with the American Water Works Association (AWWA). The information collected is to be brought back to the committee for review.

The committee asked the coordinator to find out if it would qualify as a negotiated rulemaking for the proposed rule agenda items.

New System Development

A. Drip Irrigation Working Session. Joe Canning led a discussion of drip irrigation usage around the country. A draft drip disposal system handout was provided to the committee. The committee expressed an interest in these types of systems and developed a list of items that need to be addressed before proceeding. The issue of shallow system placement and freezing was discussed. The drip tubing is pressurized with effluent from the septic tank and results in soil thawing around the emitters. Joe proposed taking the list of elements for development of a new alternative to BSU's Engineering program and getting the subject as a class project.

There is some interest at BSU in having a senior class project develop a drip irrigation alternative. The subjects to be considered are background research, nutrient uptake, soils long term acceptance rates, review state regulatory programs, and O&M issues.

Barry and Joe are to work together to develop a draft Drip Irrigation alternative section to the TGM. See Appendix D.

B. Grey Water System Re-review. The coordinator presented to the committee the proposed Grey Water System for re-review. The committee reviewed the proposal and made some changes to the draft document. The committee is concerned with system cost, limited usage and whether or not an engineer should design these types of systems. Flow estimates for gray water may need to mirror the proposed rule change wastewater flow approach. The committee directed the coordinator to make the revisions and to send out to health districts and DEQ for review comments. See Appendix D.

C. Constructed Wetland Update. The coordinator presented to the committee slides of an experimental constructed wetland from the Twin Falls area. The state has some funding to install two experimental constructed wetlands and to conduct sampling of the influent and effluent from each wetland.

Issues from the field

A. RV Developments and Drainfields. Two documents were handed out, an e-mail from Panhandle Health District and a position paper from District 7. The questions posed are whether RVs are considered a dwelling and permitting travel trailer parks. Ken Babin led the discussion and described the situation in his district of the spread of subdivisions on water front properties that are using RVs for recreational opportunities. These subdivisions were platted with sanitary restrictions in force. RVs are taking the place of dwellings and complaints are filed occasionally for sewage on the ground.

The committee discussed the circumstances of these types of development. The committee concludes that RVs are not residences as set up in the rules. Building permits are probably not required unless local ordinances specify that a building permit is needed for RV trailers. Local county code enforcement officers (Ada, Kootenai, and Bannock, Others?) if available, could respond to complaints, otherwise SOG complaints will have to be followed up by district staff. Planning and Zoning should be informed of the problems (environmental, health and safety) associated with these types of land use planning decisions.

RV Parks and Travel Trailer parks. The committee discussed system design and concluded that systems should be designed based on the rules and estimated wastewater flow from the travel trailers. RV Dump Stations permits would be required and all travel trailers would use the dump station prior to connecting into a system sized and permitted for travel trailers. All sections of the rules apply for siting a system.

B. Electrical System Requirements. Recently staff have been out on inspections and have had conflicts with the TGMs pressure distribution systems section requiring NEHA explosion proof boxes for dosing chamber installations. The Electrical Division is not requiring an explosion proof box if the seal off is before the connection box. The Electrical Division requires corrosion proof boxes. The committee directed the coordinator to correspond with the Electrical Division and ask if the information on pages 58-59 is acceptable with them.

C. Water Softeners. These are acceptable devices to connect into a septic system. Proper operation and maintenance is needed. Excessive regeneration rates add excessive amounts of wastewater into the systems, thus the need for proper O&M.

D. Floor Drains for Residences. The question was if EPA is banning floor drains in auto body shops and garages then shouldn't we do the same for residences. The committee suggested that EPA considered the problem and opted to tackle the sources with the biggest problems first. Some districts don't allow garage floor drains to discharge to the SSDS. Oils and gasoline would be prohibited by the rule to be discharged into a SSDS (TGM page 102). Floor drains in garages are used for residences in areas of the state with heavy winters.

E. Septic Tank Sealers. A tank manufacturer had asked about a list of approved sealers for inside the septic tank. The committee accepts ConSeal, ThoroSeal, and Miller Liner (molded polyethylene liner).

F. Cut Off Trenches. The complaint is that the setbacks for the cut off trench are too great and that cut off trenches are not working. Request was for the setback to be reduced to 10-20 feet. The committee replied that cut off trenches will only be successful if an impermeable layer is keyed into the bottom of the trench. The committee disagreed with the request to reduce the setback distance to 10-20feet. This small of a setback would induce short-circuiting of the effluent and result in a discharge of partially treated wastewater into surface waters or onto the ground surface. Follow the tables on page 18-2 of the TGM. If these measures do not reduce the water table then a permit should be denied due to site limitations for high ground water.

G. Ground Water Monitoring Protocol. The committee was asked to provide guidance on ground water monitoring protocol this year due to the low snow pack. The committee recognized that this years run off would likely produced lowered water tables in area where the water tables are normally high. It is up to the local district health department staff to recognize when the water tables are below normal. This occurs seasonally and to be cautious with this years piezometer measurements. Additional monitoring next year may be required. Ground water monitoring needs to take place during the season when the water table is the highest. This may be August and September for irrigation-induced water tables or February through June for spring run off induced water tables. If the EHS is uncertain as to when the water table is highest monitoring both seasons is warranted.

H. Rules Governing the Cleaning of Septic Tanks (IDAPA 58.01.015.03.a). The City of Meridian requested that the committee change these rules to prohibit the use of sewer collection systems for the disposal of domestic septage. The committee recognizes that in some jurisdictions this is a legitimate practice and that wastewater collection superintendents have authorized this form of disposal to licensed pumpers. The committee agreed to revise the rule to read: "Discharge to a public sewer, provided permission is given from the public sewer authority."

I. Sealing Ponds Using Bentonite. The committee was asked to provide guidance on using bentonite as a sealer for ponds. The information provided listed the methods for sealing ponds that are excavated and above the water table. Placement of bentonite into excavations and developing a seal to hold water is an acceptable method to construct a pond. These ponds excavated above the high ground water and sealed with bentonite do not need to meet the surface water setback. Excavating into ground water to create a pond and then attempting to seal the pond is not an acceptable practice. The submitted documents recognize this and lists areas with high water tables, artesian flowing water or other site related problems as not being suitable locations for using bentonite liners.

APPENDIX B

TGC
Final Approvals
December 4, 2001

2. Concrete Tanks

a. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.

b. Reinforcing steel shall be ASTM A-615 Grade 60, fy=60,000 psi, details and placement shall be in accordance with ACI 315 and ACI 318 or equivalent as certified by a licensed structural engineer.

c. Concrete shall be ready-mix with cement conforming to ASTM C-150, Type II. It shall have a cement content of not less than 5 sacks per cubic yard and a maximum aggregate size of 3/4 inch. Water/cement ratio shall be kept low ($0.45\pm$), and concrete shall achieve a minimum compressive strength of 3,000 psi in 28 days.

d. Form release used on tank molds shall be compatible with the water seal method used.

e. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for 7 days or has reached two-thirds of the design strength.

f. In order to demonstrate watertightness, tanks shall be tested prior to acceptance. The tank shall be tested by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and examined for visible leaks.

3. Polyethylene and Fiberglass Tanks

a. Polyethylene and fiberglass tanks shall meet or exceed Canadian Standard CAN 3-B66-M85. Report from an independent testing company certifying that the tank meets the Canadian Standard is required.

b. Installation instructions, prepared by the manufacturer, shall accompany each tank. Strict conformance with the backfill instructions will be required.

c. On-site hydrostatic testing is suggested prior to installation. The tank should be filled with water for one hour. Any leakage or dimensional change greater than 1/2 inch shall be cause for rejection.

4. Septic Tank Abandonment. If in the opinion of the Director a septic system is abandoned (58.01.03.003.01) and it is necessary to protect the public's health and safety from the eventual collapse of the septic tank or its misuse, the Director shall require the septic tank to be abandoned by:

a. Disconnection of the inlet and outlet piping, and

APPENIDIX C

Draft Proposed
Gravelless Trench Sizing
Method

DEQ Proposed Gravelless Trench Sizing
November 30, 2001

Background

DEQ has approved various gravelless trench components using several different approaches for determining sizing factors (TGM page 78-3). Recently these sizing approaches have been requested to be applied to the various gravelless trench products. The TGC and DEQ are interested in developing a standard method to size gravelless trench components. A sizing method for alternative gravelless trench components must meet or exceed the conditions provided by a standard gravel drainfield.

Standard Drainfields

The drainfield is a covered excavation filled with a porous media with means of introducing and distributing the wastewater through out the system. The distribution system discharges the wastewater into the voids of the porous media. The voids maintain exposure of the soil's infiltrative surface and provide storage for the wastewater until it can seep away into the surrounding soil (EPA, 1980[BB1]).

Bottom Area and Sidewall Area

Both the bottoms and sidewalls of the trenches are infiltrative surfaces (EPA, 1980[BB2]). After a period of wastewater application, the bottom can become sufficiently clogged to pond liquid above it, at which time the sidewalls become infiltrative surfaces (EPA 1980[BB3]). Because the hydraulic gradients and resistances of the clogging mats on the bottom and sidewalls are not likely to be the same, the infiltration rates may be different. The objective in design is to maximize the area of the surface expected to have the highest infiltration rate while assuring adequate treatment of wastewater and protection of ground water. (EPA, 1980[BB4]).

Because the sidewall is a vertical surface, clogging may not be as severe as that which occurs at the bottom surface, due to several factors:

1) suspended solids in the wastewater may not be a significant factor in sidewall clogging;
2) the rising and falling liquid levels in the system allow alternative wetting and drying of the sidewall while the bottom may remain continuously inundated; and
3) the clogging mat can slough off the sidewall.

These factors tend to make the sidewall clogging less severe than the bottom surface. However, the hydraulic gradient across the sidewall mat is also less. At the bottom surface, gravity, the hydrostatic pressure of the ponded water above, and the matric potential of the soil below the mat contribute to the total hydraulic gradient. At the sidewall, the gravity potential is zero, and the hydrostatic potential diminishes to zero at the liquid surface. Because the matric potential varies with changing soil moisture conditions, it is difficult to predict which infiltrative surface will be more effective. (US EPA, 1980[BB5]). In dry climates, the sidewall area may be used to a greater extent. The bottom area may be reduced as the sidewall area is increased.

"McGauhey and Winneberger (1965) conclude that the sidewall is "… by far the most effective infiltrative surface." They reasoned that 1) suspended solids in the effluent do not contribute to sidewall clogging, 20 rising and falling liquid levels within the system allow alternate loading and resting of the surface while the bottom is continuously inundated, and 3) sloughing of the clogging mat can occur during resting periods. Therefore, they recommend that subsurface soil absorption systems should provide a maximum of sidewall surface per unit of volume of effluent and a minimum of bottom surface” (Otis Et.al. 1978).

Otis (1985) reports his review of two column studies conducted by Jones and Taylor (1965) and Thomas et.al. (1966), both studies showed clogging to be primarily a surface phenomenon. “Both studies applied septic tank effluent to columns of sand. Jones and Taylor placed gravel on the sand surface to simulate infiltration system construction.” “A zone of low conductivity developed at or just below the gravel/sand interface.” “No gravel was used by Thomas et.al. but the results were similar. Impedance measurements showed that the top 1 cm of the sand accounted for 87% of the total impedance measured across the column.”

“Regardless of soil absorption system design, it is the interplay between clogging layer formation and soil unsaturated hydraulic conductivity that determines the maximum loading rate” Jaynes and Tyler (1985).

Tyler et.al. (1991) conducted a side by side study of 3 chamber and 3 gravel systems with the same effluent loading rates based on the bottom area of the cells. The study was conducted over a three-year period of time. The researchers collected falling head infiltration rates and wastewater ponding depths at the sandy soil sites, and measured constant head infiltration rates at the silt loam sites. For the silt loam soil the average infiltration rates of chambers was higher than gravel, however due to the variability with one cell type there was no significant differences between cell types. “At this time, it is impossible to draw conclusions concerning the long term loading rates.” For the sandy soil cells “ponding depths between the two cell types varied over time.” Initially the ponding depths were deeper in the chamber cells than the gravel cells. Gravel cell ponding was greater than the chamber cell ponding at the end of the test period. “Variability increased greatly in the due to mechanical problems and makes interpretation of the data impossible.” All cells ponded in the first winter of use. Ponding fluctuated seasonally with deeper ponding in the colder seasons.

Florida conducted a one-year experimental study of chamber products sized at a 40% reduction in comparison to a standard gravel system. The author’s concluded, “we cannot with assurance state, that when systems are designed at 40% reduction of the conventional size, and where flow may be equal or exceed the maximum design sewage flows, these systems will operate properly over the long-term (LTAR) Barranco and Sherman (1991).

Function of Gravel

The function of the porous media placed below and around the distribution pipe is four-fold. Its primary purposes are to support the distribution pipe and to provide a media through which the wastewater can flow from the distribution pipe to reach the bottom and sidewall infiltration areas. A second function is to provide storage of peak wastewater flows. Third, the media dissipates any energy that the incoming wastewater may have which could erode the infiltrative surface. Finally, the media supports the sidewall of the excavation to prevent its collapse. (US EPA, 1980[BB6]).

Two of these functions can be examined for further evaluation and comparison of gravelless trench alternative systems with standard gravel drainfields. These two functions are 1) to provide a media through which septic tank effluent can flow and reach the bottom and sidewall infiltrative areas and 2) provide storage of peak wastewater flows.

A. Sidewall support/ infiltrative surface area.

The standard drainfield in Idaho is a 3-ft wide by 1ft deep gravel trench with a 4 inch perforated pipe placed with 6 inches of gravel below the pipe and 2 inches of gravel above. These trenches are sized at 3 ft^2/ft of trench length. The state uses a 40% margin of safety when sizing 3-ft wide drainfields as explained below:

Infiltrative surface area for standard 3' wide gravel drainfield:

Infiltrative surface area is equal to bottom area plus side wall and is adjusted by a 40% MOS

$(Bft^2/ft + 2S\ ft^2/ft) \times 0.60 =$ infiltrative area

$(3\ ft^2/ft + 2(1\ ft^2/ft)) \times 0.60 = 5\ ft^2/ft \times 0.60 = 3.0\ ft^2/ft$

The standard infiltrative area for drainfields is 3.0 ft^2/ft. In order to compare the infiltrative surface area and storage volume these two functions need to be normalized in order to make a combined comparison. To accomplish this the infiltrative area of the system being evaluated is divided by 3.0 ft^2/ft. A standard drainfield receives 100% credit.

$$\frac{3.0\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 100\%$$

Alternative systems must achieve 100% to be equivalent to the standard drainfield for infiltrative area. "Jensen (1986) suggested that sidewalls and bottom area are regarded as equal infiltration surfaces, hence, loading rates should be determined based on a total sidewall and bottom surface area" Jenssen and Siegrist, (1991).

B. Storage volume for peak wastewater flows.

Storage volume is the capacity of the standard 3' wide drainfield to store peak wastewater flows during period of wastewater generation that exceeds the infiltrative capacity of the system. For the standard drainfield the storage volume is equal to the basal width times the sidewall height times the length times the percent void volume of the aggregate. Storage volume for alternative media or gravelless trench products will need to be reviewed. Storage volume allows for the comparison of similarly designed products that have gravel substitutes with products that do not use a media.

For the standard drainfield the storage volume is:

Bw x Sht x L x Void Volume

3 ft x 1ft x 1 ft x 0.35 = 1.05 ft3/ft

The standard drainfield storage volume is 1.05 ft3/ft. In order to compare the storage volume with the surface area these two functions need to be normalized in order to make a combined comparison. To accomplish this the storage volume of the system being evaluated is divided by 1.05 ft3/ft. A standard drainfield receives 100% credit.

$$\frac{1.05\ ft3/ft}{1.05\ ft3/ft} \times 100 = 100\%$$

Alternative systems must achieve 100% to be equivalent to the standard drainfield for storage volume.

<u>Gravelless Trench System Sizing</u>

A standard drainfield has 100% or 1 point for infiltrative surface and 100% or 1 point for storage volume for a total of two points. Standard drainfields are sized at 3 ft^2/ft for sizing. Dividing the standard drainfield sizing 3 ft^2/ft by 2 points results in a 1.5 ft^2/ft per point. This method uses both storage volume and infiltrative area as functions of gravel that relate to system sizing. All alternative systems and gravel trenches of various widths can be compared and given a sizing factor based on the combined normalized infiltrative area and storage volume. All alternative systems must achieve 2 points to be considered equivalent to a standard drainfield. Alternatives that are greater than 2 points are given an increased sizing factor (reduced size drainfield requirement) and alternatives that are less than 2 points are given an reduced sizing requirement (requires a larger drainfield).

Examples of trench component sizing using revised method:

Example#1: 6 ft wide gravel drainfield:

1. Calculate infiltrative area

$(Bft^2/ft + 2S\ ft^2/ft) \times 0.60 = \text{infiltrative area}$

$(6\ ft^2/ft + 2(1\ ft^2/ft)) \times 0.60 = 8\ ft^2/ft \times 0.60 = 4.8\ ft^2/ft$

$\frac{4.8\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 160\%$ of the infiltrative area

2. Calculate storage volume

Bw x Sht x L x Void Volume

6 ft x 1ft x 1 ft x 0.35 = 2.1 ft3/ft

$\frac{2.1\ ft3/ft}{1.05\ ft3/ft} \times 100 = 200\%$

3. Calculate the total points and multiply by 1.5 ft^2/ft

$(IA + SV) \times 1.5\ ft^2/ft/pt = \text{sizing factor } ft^2/ft$

$(1.6 + 2.0) \times 1.5\ ft^2/ft/pt = 5.4\ ft^2/ft$

Note this system would previously have been awarded 6 ft^2/ft.

Example#2: 10inch large diameter pipe.

1. Calculate infiltrative area

$(Bft^2/ft + 2S\ ft^2/ft) \times 0.60 = \text{infiltrative area}$

$(0.83\ ft^2/ft + 2(0.83\ ft^2/ft)) \times 0.60 = 2.5\ ft^2/ft \times 0.60 = 1.5\ ft^2/ft$

$\frac{1.5\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 50\%$ of the infiltrative area

2. Calculate storage volume

Pi x r^2 x L x Void Volume

$3.14 \times (0.42ft)^2 \times 1\ ft \times 1.0 = 0.55$ ft3/ft

$\frac{0.55\ ft3/ft}{1.05\ ft3/ft} \times 100 = 52.4\%$

3. Calculate the total points and multiply by 1.5 ft^2/ft

$(IA + SV) \times 1.5\ ft^2/ft/pt = \text{sizing factor}\ ft^2/ft$

$(0.5 + 0.524) \times 1.5\ ft^2/ft/pt = 1.54\ ft^2/ft$

Sizing factor for 10 inch Large Diameter pipe is 1.54 ft^2/ft. Previously this product was sized at 3.0 ft^2/ft.

Example#3: Domed chamber with an open bottom width of 34 inches and a louver height of 6.5 inches.

1. Calculate infiltrative area

$(B\,ft^2/ft + 2S\ ft^2/ft) \times 0.60 = \text{infiltrative area}$

$(2.83\ ft^2/ft + 2(0.54\ ft^2/ft)) \times 0.60 = 3.91\ ft^2/ft \times 0.60 = 2.35\ ft^2/ft$

$\frac{2.35\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 78.3\%$ of the infiltrative area

2. Calculate storage volume

Bw x Sht x L x Void Volume

2.83 ft x 0.583 ft x 1 ft x 1.0 = 1.65 ft3/ft*

$\frac{1.65\ ft3/ft}{1.05\ ft3/ft} \times 100 = 157\%$

*(value from product literature).

3. Calculate the total points and multiply by 1.5 ft^2/ft

$(IA + SV) \times 1.5\ ft^2/ft/pt = \text{sizing factor}\ ft^2/ft$

$(0.783 + 1.57) \times 1.5\ ft^2/ft/pt = 3.53\ ft^2/ft$

Sizing factor for this domed chamber is 3.53 ft^2/ft. Previously this product was sized at 4.7 ft^2/ft.

Example#4: Domed chamber with an open bottom width of 34 inches and a louver height of 12 inches.

1. Calculate infiltrative area

$(B\,ft^2/ft + 2S\ ft^2/ft) \times 0.60 = \text{infiltrative area}$

$(2.83\ ft^2/ft + 2(1.0\ ft^2/ft)) \times 0.60 = 4.83\ ft^2/ft \times 0.60 = 2.90\ ft^2/ft$

$\frac{2.90\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 96.7\%$ of the infiltrative area

2. Calculate storage volume

Bw x Sht x L x Void Volume

2.83 ft x 0.922 ft x 1 ft x 1.0 = 2.61 ft3/ft*

$\frac{2.61\ ft3/ft}{1.05\ ft3/ft} \times 100 = 248\%$

*(value from product literature)

3. Calculate the total points and multiply by 1.5 ft^2/ft

$(IA + SV) \times 1.5\ ft^2/ft/pt = \text{sizing factor}\ ft^2/ft$

$(0.967 + 2.48) \times 1.5\ ft^2/ft/pt = 5.17\ ft^2/ft$

Sizing factor for this domed chamber is 5.17 ft^2/ft. Previously this product was sized at 4.7 ft^2/ft.

Example#5: Alternative media system 36 inches wide and 12 inches height.

1. Calculate infiltrative area

   $(B ft^2/ft + 2S\ ft^2/ft) \times 0.60 =$ infiltrative area

   $(3.0\ ft^2/ft + 2(1.0\ ft^2/ft)) \times 0.60 = 5.0\ ft^2/ft \times 0.60 = 3.0\ ft^2/ft$

   $\frac{3.0\ ft^2/ft}{3.0\ ft^2/ft} \times 100 = 100\%$ of the infiltrative area

2. Calculate storage volume

   Bw x Sht x L x Void Volume

   3.0 ft x 1.0 ft x 1 ft x 0.57* = 1.71 ft3/ft

   $\frac{1.71\ ft3/ft}{1.05\ ft3/ft} \times 100 = 163\%$

3. Calculate the total points and multiply by 1.5 ft^2/ft

   $(IA + SV) \times 1.5\ ft^2/ft/pt =$ sizing factor ft^2/ft

   $(1.0 + 1.63) \times 1.5\ ft^2/ft/pt = 3.94\ ft^2/ft$

Sizing factor for this alternative media product is 3.94 ft^2/ft. Previously this product was sized at 4.17 ft^2/ft.

*This example is subject to testing the void volume of the new media.

The revised sizing method is suitable for use on any gravel or gravelless alternative system. The revised approach uses two functions of drainfield aggregate to base alternative system sizing comparisons. The revised sizing method accounts for infiltration through the bottom and sidewall areas and provides a mechanism to account for storage of wastewater in the various system designs.

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Appendix D

TGM Updates

Technical Guidance Committee
Policy # 2000-1
November 21, 2000

Monitoring Requirements for Existing Extended Treatment Package Systems

Purpose:

The Technical Guidance Committee for Individual and Subsurface Sewage Disposal (TGC) in considering amending the Extended Treatment Package System section of the Technical Guidance Manual to include monitoring requirements recognizes that some permits were issued for existing extended treatment package systems that did not include monitoring requirements. The following policy is adopted as a guide to the District Health Departments in which monitoring of extended treatment packages systems was <u>not</u> an original requirement for the operation and maintenance entity.

Policy

Monitoring of extended treatment package systems is the responsibility of the Operation and Maintenance Company (O&M), if monitoring was made a condition of the permit at the time the permit was issued. The Health Districts are responsible for monitoring of systems in which the permit does not specify that monitoring is required, until such time that the sampling indicates a problem exists. Once a problem is detected as indicated by a BOD or TSS greater than 30 mg/l, or when required the total Nitrogen is greater than 27 mg/l, then the monitoring requirement transfers to the O&M entity.

Applicability

This policy applies to extended treatment package system permits issued prior to November 21, 2000.

Technical Guidance Committee
Policy # 2000-2
November 21, 2000

Installer Classes and Examinations

Purpose:

The Technical Guidance Committee for Individual and Subsurface Sewage Disposal (TGC) recognizes the need for statewide consistency in installer licensing protocols. The following policy is adopted as a guide to the District Health Departments to implement Subsection 58.01.03.006 Installers Registration Permit.

Policy

Installers are to attend installers training classes to keep current and up-to-date with the latest changes in the Technical Guidance Manual in order to maintain their licensure status (See subsection 58.01.03.006.03. Permits Required Annually).

If an Installer allows the license to lapse for one year, then the installer is required to retest in order to become licensed.

TGC recommends that the Complex Installer Exams be given as an open book test.

Pipe Materials for Specified Uses

House to Tank	**Septic Tank and Dosing Chamber Excavation**	**Effluent Line** [3]	**Drainfield** [3]	**Septic Tank Baffles**[4]
Plumbing Bureau	DEQ/HD	DEQ/HD	DEQ/HD	DEQ/HD
[1]ABS SCH 40	ABS SCH 40	ABS SCH 40	ABS SCH 40	ABS SCH 40
	[2]ASTM D-3033 PVC	ASTM D-3033 PVC	ASTM D-3033 PVC	
ASTM D-3034 PVC	[2]ASTM D-3034 PVC	ASTM D-3034 PVC	ASTM D-3034 PVC	ASTM D-3034 PVC
		ASTM D-2729 PVC	ASTM D-2729 PVC	Polylok Baffle
		[5]ASTM F810 PE	ASTM F810 PE	
			[6]ASTM F405 PE	

[1] ABS Schedule 40 or material of equal or greater strength piping. Requirement by rule 58.01.03.007.21.a.

[2] Excavation must be compacted with Fill material to 90% standard proctor density, with a minimum of 12 inches of cover material. Requirement by rule 58.01.03.007.21.b.

[3] Specified on page 22 of the Technical Guidance Manual for Subsurface Sewage Disposal.

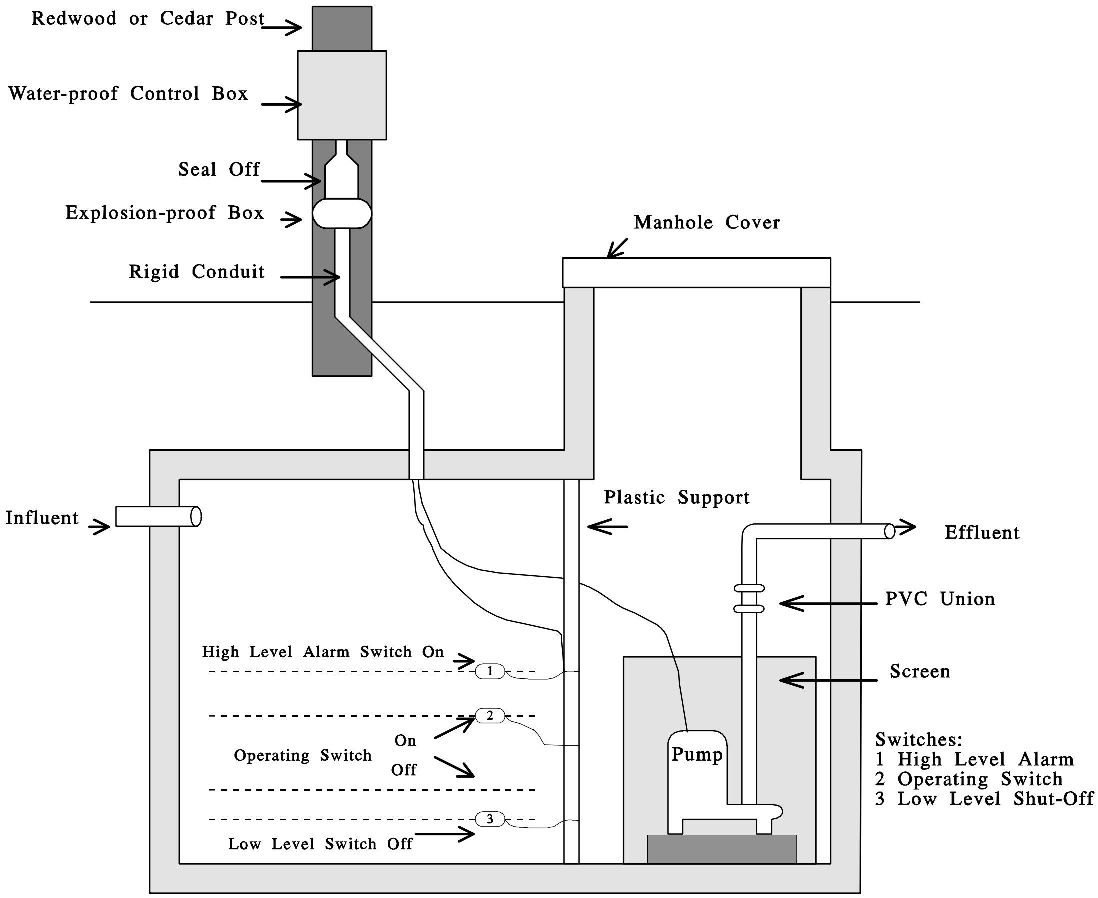
[4] Must use ASTM D-3034 or equivalent as specified on page 22 of the Technical Guidance Manual for Subsurface Sewage Disposal.

[5]Smooth Wall High Density Polyethylene (PE), suitable for effluent and drainfield piping.

[6]Corrugated High Density Polyethylene (PE), flexible, suitable for drainfield piping.

PVC = Poly Vinyl Chloride
ABS = Acrylonitrile-Butadiene-Styrene

7. Dosing Chamber:



a. The dosing chamber must be watertight, with all joints sealed. Precautions must be made in high-groundwater areas to prevent the tank from floating.

b. A screen must be placed around the pump with 1/8" holes or slits of non-corrosive material and have a minimum of 12 square feet of area. Its placement must not interfere with the floats and it should be easily removable for cleaning. <u>Effluent filter designs fitted with a closing mechanism are a suitable alternative to screens around pumps.</u>

c. Electrical Requirements:

1) Visual or audio alarms on a separate circuit from the pump must be provided to indicate when the level of effluent in the pump or siphon chamber is higher than the height of the volume of one dose.

2) All electrical connections must be made outside of the chamber in an explosion-proof junction box (Crouse-Hind Type EAB or equivalent). The lines from the junction box to the control box must pass through a seal-off (Crouse-Hinds GUB or equivalent). All wires must be contained in solid conduit from the dosing chamber to the control box.

3) The minimum effluent level must be above the pump. This is the level that the low level off switch is set and should be 2-3" above the pump.

Evaluating Fill Material At Septic Systems Sites (Cont'd)

The original soil should not have been compacted prior to the placement of fill. Compaction can easily happen at construction sites if equipment, or other types of vehicles have been operated during periods when the site was wet. On sloping areas, preventing compaction is very critical because saturation zones can develop just above the compacted layer, creating stability problems. Loose soils with significant amounts of volcanic ash are particularly susceptible to compaction.

Sites should be avoided where fill has been dumped in piles for a long period and then leveled out. This will cause differential settling. The calculation of settling time will begin after leveling.

One way to check for compaction is to run a knife or geology pick point vertically on the face of a pit. Depth of penetration should be about 1/2 to 1" into the soil. Changes in resistance to the movement of this sharp object across the soil horizon is an indication of compaction. Very distinct platy structure or high bulk density is also an indication of compaction.

Fills of a different texture than the underlying natural soil can have stability problems on slopes if the underlying soil has a finer texture by 2 subgroups and a potentially slower permeability. Deep mixing of the fill with the top 12 inches of the native soil may help alleviate the problem on slopes less than 15%.

Demolition material; stumps, trash, large rock, in fill may make the site unsuitable.

If the fill is thin, less than 24 inches, the system may be in the natural soil. Guidelines for cap and fill systems will apply. Because of their greater variability, fills will require more extensive on-site investigation to determine the existence of restrictive layers, inclusion of stumps, demolition materials, etc.

This section is intended to provide general information for property owners to consider when filling a site and it is not an approved alternative design.

APPENIDIX E

TGC
New System Development
December 4, 2001

GRAYWATER SYSTEM

Description. Graywater is untreated household wastewater that has not come into contact with toilet waste. Graywater includes used water from bathtubs, showers, bathroom wash basins and water from clothes washing machines and laundry tubs. It shall not include wastewater from kitchen sinks, dishwashers or laundry water from soiled diapers. A graywater system consists of a separate plumbing system from the black waste and kitchen plumbing, a surge tank to temporarily hold large drain flows, a filter to remove particles that could clog the irrigation system, a pump to move the graywater from the surge tank to the irrigation field, and an irrigation system to distribute the graywater.

Conditions for Approval.

1. Graywater treatment and disposal systems must meet all the separation distance setback criteria and soil application rate criteria as found in the rules.

2. Specialized plumbing designs will need to be approved by the Division of Building Safety, Plumbing Bureau.

3. Graywater surge tanks must meet all requirements of septic tanks.

4. Operations and Maintenance manuals must be provided to the owner of the property.

5. Graywater may not be used to irrigate vegetable gardens.

6. ~~Graywater systems may only be permitted for individual dwellings.~~

7. The capacity of the septic tank and size of the blackwaste drainfield and replacement area shall not be reduced by the existence or proposed installation of a graywater system servicing the dwelling.

8. Graywater shall not be applied on the land surface or be allowed to reach the land surface.

Design Requirements:

1. Graywater flows are determined by calculating the maximum number of occupants in the dwelling, based on the first bedroom with two occupants and each bedroom thereafter with one occupant. Estimated daily graywater flows for each occupant are:

Showers, bathtubs, and wash basins (total)	25 Gal./Day/Occupant
Clothes washer	15 Gal./Day/Occupant

Multiply the number of occupants by the estimated graywater flow.

Ex. Three-bedroom house will have a design for four (4) people. The house has a clothes washer connection, then each occupant is assumed to produce 40 Gallons of graywater per day, resulting in a total of 160 gallons per day.

2. The following formula is used to estimate the square footage of landscape to be irrigated:

$$LA = \frac{GW}{ET \times PF \times 0.62}$$

where: GW = estimated graywater produced (Gallons per Week)
LA = Landscaped area (ft^2)
ET = Evapotranspiration (inches per week)
PF = Plant Factor, based on climate and type of plants either 0.3, 0.5, or 0.8
0.62 = conversion factor (from inches of ET to gallons per week)

Example. If ET = 2 inches per week, and lawn grasses are grown with a PF of 0.8 (high water using) then the landscaped area is equal to: LA = (160 GPD x 7 Days)/ (2 x 0.8 x 0.62) = 1,129 ft^2 of lawn.

3. An alternative to using graywater for lawns is to irrigate landscape plants. A plant factor is dependent upon the type of plants to be watered, an ET rate, and plant canopy. The following table can be used to calculate square footage of landscape plants that are able to be irrigated with graywater:

ET (Inches per Week)	Relative Water Need of Plant	Gallons per Week 200 ft^2 Canopy	100 ft^2 Canopy	50 ft^2 Canopy
1 Inch per Week	Low Water Using 0.3	38	19	10
	Med. Water Using 0.5	62	31	16
	High Water Using 0.8	100	50	25
2 Inches per Week	Low Water Using 0.3	76	38	19
	Med. Water Using 0.5	124	62	31
	High Water Using 0.8	200	100	50
3 Inches per Week	Low Water Using 0.3	114	57	28
	Med. Water Using 0.5	186	93	47
	High Water Using 0.8	300	150	75

Gallons per week calculation for this chart was determined with the following formula:
Gal/Week = ET x Plant Factor x Area x 0.62 (Conversion factor). This formula does not account for irrigation efficiency. If the irrigation system does not distribute water evenly, extra water will need to be applied.

Example: 4 bedroom home with a washer will produce 1,120 gallons per week (7days x 160GPD). If ET = 2 inches per week, then the 1,120 gallons of gray water a homeowner could irrigate:

8 small fruit trees:	8 x 50 = 400 gallons (high water using, 50 ft canopy)
8 medium shade trees:	8 x 62 = 496 gallons (med. water using, 100 ft canopy)
7 large shrubs:	7 x 31 = 217 gallons (med. water using, 50 ft canopy)
Total water use per week:	1,113 gallons per week

Other Requirements.

1. The Graywater Standards (UPC) require that all graywater piping be marked "Danger Unsafe Water."

2. Valves in the plumbing system must be readily accessible, and backwater valves must be installed on surge/holding tank drain connections to sanitary drains or sewer piping. Finally all piping must be downstream of a waterseal type trap(s) if no such trap exists, an approved vented running trap shall be installed upstream of the connection to protect the building from possible waste or sewer gasses.

3. Surge tank must be vented and have a locking gasketed lid. A minimum capacity of 50 gallons is required. The surge tank must be placed on a 3-inch concrete slab or on dry level compacted soil and labeled "Graywater Irrigation System, Danger-Unsafe Water." Surge tanks shall be constructed of solid durable materials, not subject to excessive corrosion or decay, and shall be watertight. The tank drain and overflow gravity drain must be permanently connected to the septic tank or sewer line. The drain and overflow drain shall not be less in size than the inlet pipe.

4. Filters are required for subsurface drip irrigation systems. Filters are 100 microns with a flow capacity of 25 gallons per minute.

5. Pumps are usually required to lift the graywater from the surge tank to the irrigation system (See pressure Distribution System Section). Alternatively if all of the landscape plants are below the building drain lines then the graywater irrigation system could use gravity to distribute the graywater.

6. Irrigation system can be either a mini-leachfield or an experimental subsurface drip irrigation system. Mini-leachfield designs follow the rules and are required to use geotextile for the drainrock soil barrier.

Notes:

1. The following plants are tolerant of sodium and chloride ions or have been reported to do well under graywater irrigation:

Crape Myrtle	Redwoods	Star Jasmine	Holly	Deodar Cedar
Bermuda Grass	Honeysuckle	Oaks	Cottonwood	Arizona Cypress
Oleander	Bougainvillea	Rose	Rosemary	Agapanthus
Italian Stone Pine	Purple Hopseed Bush	Olive	Juniper	Sweet Clover
Strawberry Clover	Evergreen Shrubs	Pfitzer Bush		Carpet Grass

2. Several different types of media can be used in graywater filtration. These include: nylon or cloth filters, sand filters, and rack or grate filters.

3. Mini-Leachfield Design Criteria:

Mini-Leachfield Design Criteria	Minimum	Maximum
Number of drain lines per irrigation zone	1	---
Length of each perforated line	---	100 ft
Bottom width of trench	6 inches	18 inches
Total depth of trench	12 inches	18 inches
Spacing of line, Center to Center	3 ft	4 ft
Depth of earth cover over lines	6 inches	12 inches
Depth of aggregate over pipe	2 inches	---
Depth of aggregate beneath pipe	2 inches	---
Grade on perforated pipe	Level	1 inch / 100 ft

References

1. Graywater Guide: Using graywater in your home landscape. December 1994. Department of Water Resources, Sacramento California, 35 pgs.

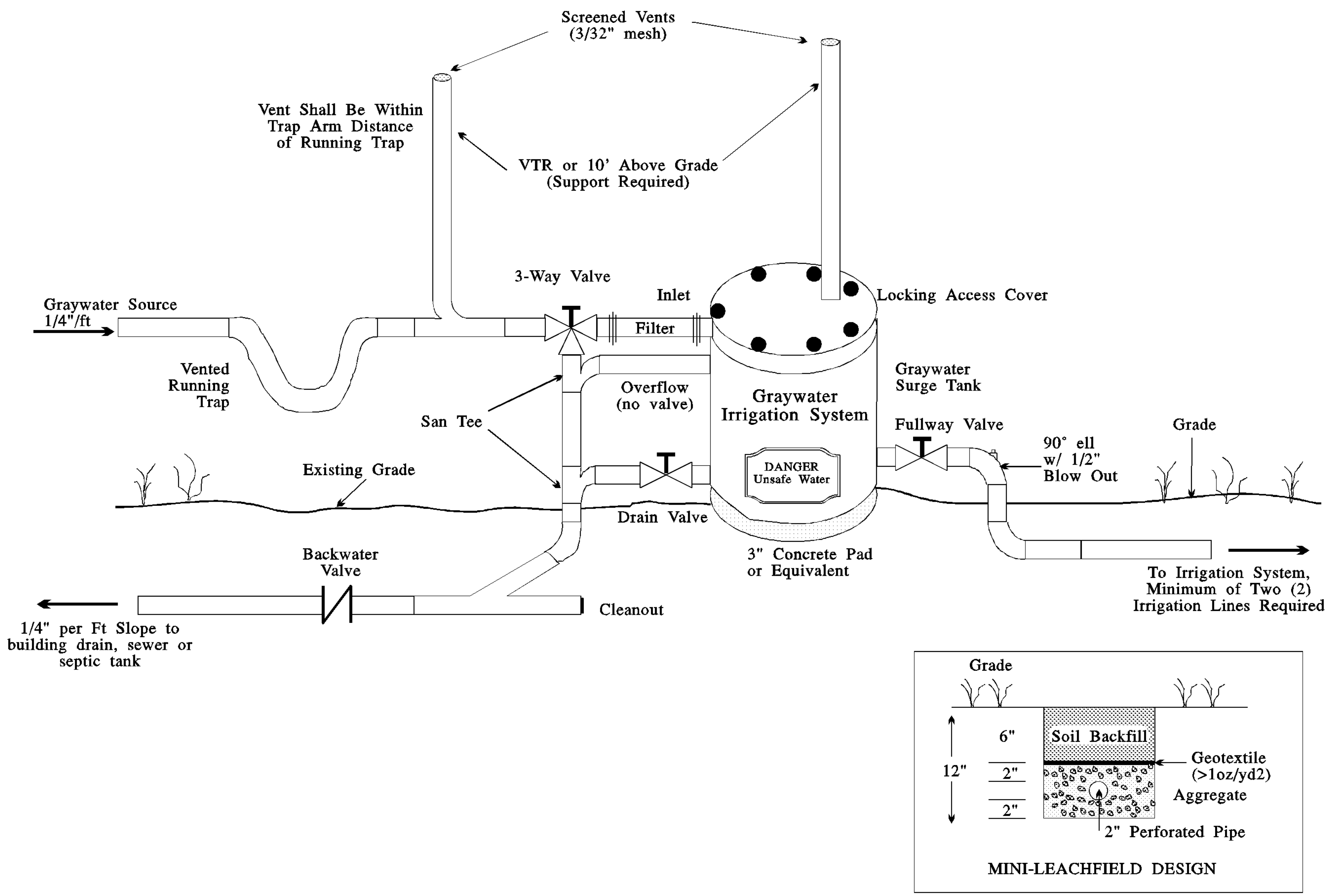
2. California Plumbing Code, Title 24, Part 5, California Administrative Code. Appendix J. May 17, 1993. 12 pgs.

3. Graywater Pilot Project: Mid-Course Report. City of Los Angles, Office of Water Reclamation. June 18, 1992.

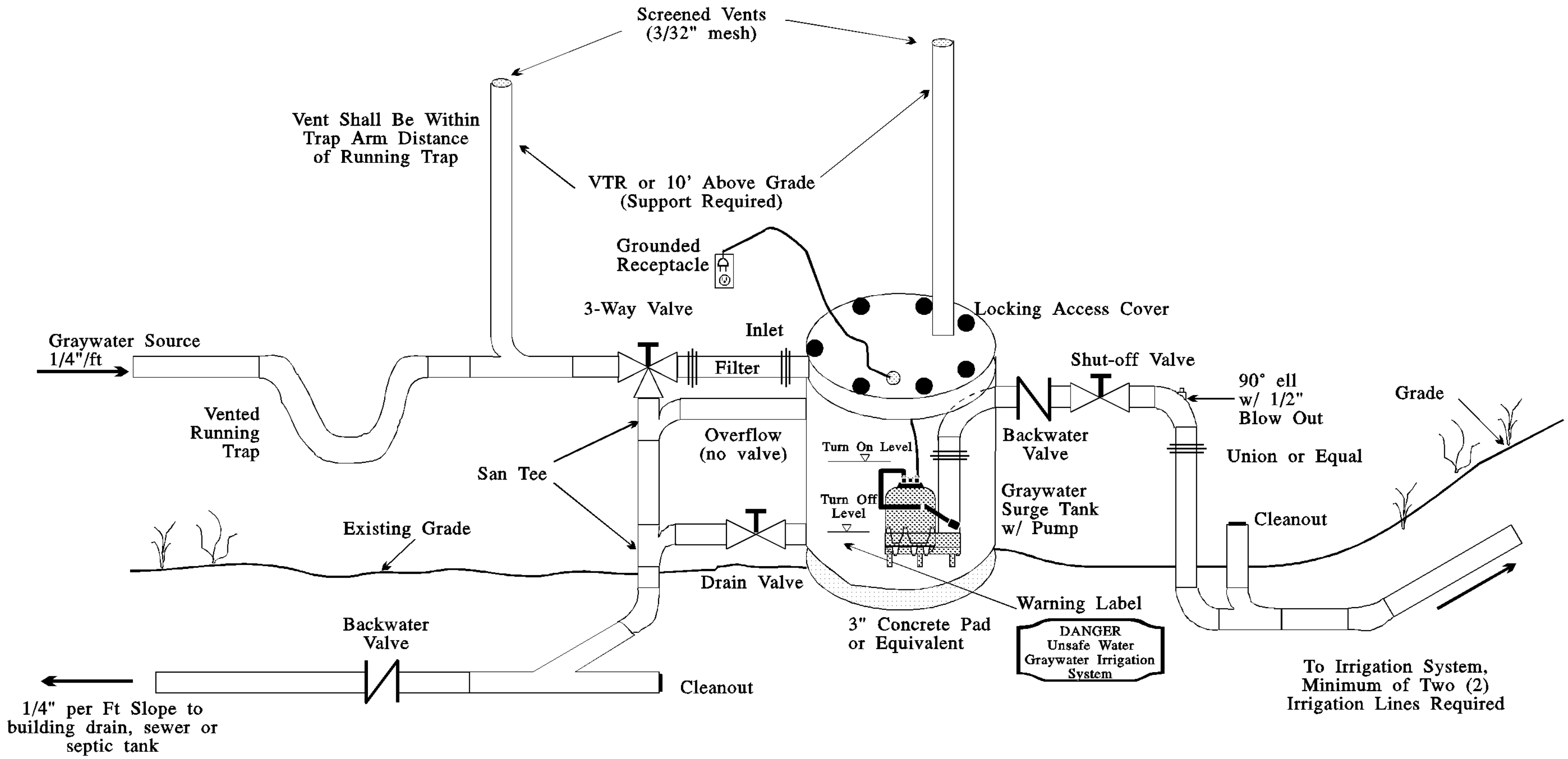
4. Assessment of On-site Graywater and Combined Wastewater Treatment and Recycling Systems. National Association of Plumbing-Heating-Cooling Contractors, 180 S. Washington St. Falls Church, VA, 22046.

5. Uniform Plumbing Code 2000 edition. 1999. Appendix G: Graywater Systems for Single Family Dwellings. International Association of Plumbing and Mechanical Officials, 20001 Walnut Drive South, Walnut CA 91789-2825, pgs 215-224.

GRAYWATER SYSTEM (Single Tank - Gravity)



GRAYWATER SYSTEM (Single Tank - Pumped)



DRIP DISTRIBUTION SYSTEM

Description: A small-diameter flexible piping network with emitters to discharge filtered effluent into the root zone of the receiving soils. The system is composed of a septic tank, (optional pretreatment system: Intermittent sand filter /Recirculating gravel filter, Extended Treatment Package System), filtering system (cartridge, or disk filters), a dosing system and process controller. Typical components include a 1,000 gallon septic tank and a 1,000 gallon pump tank, (optional pretreatment system), an effluent dosing pump, flushable disk filter, a flow meter, a programmable logic controller, and a network of shallow, self cleaning drip irrigation lines.

Conditions of Approval.

1. Drip distribution drainfields shall only be installed at locations that meet the criteria in the site suitability subsection of the rules (TGM page 119 58.01.03.008.02). The effective soil depths that are established for alternative pretreatment systems may be applied to drip distribution systems.
2. The size of an acceptable site must be large enough to construct two complete drip distribution drainfields; each sized to receive 100% of the design wastewater flow.
3.

Design.

1. Application rates up to 2 ft^2/ft of drip irrigation line may be used.
2. Drip lines may be placed on a minimum of two feet centers.
3. Drip lines are placed directly in native soil at a depth of 6” to 18” with a minimum final cover of 12”. The design application rate is based on the most restrictive soil type encountered within two feet of the drip lines.
4. Septic tank effluent is required to be filtered with a 100-micron disk filter prior to discharge into the drip piping system.
5. Drip laterals are flushed once every two weeks to prevent biofilm and solids build up in the piping network. Minimum flushing velocity is 2 feet/second at the return ends of the distribution lines and in the drip irrigation tubing during field flush cycles and long enough to fill all lines and achieve several pipe volume changes in each lateral.
6. Minimum of two vacuum relief valves per zone. Valves are located at the highest points on both the distribution and return manifolds. Vacuum relief valves are located in a valve box, adequately drained, and insulated to prevent freezing.
7. Pressure regulators/pressure compensators are to be used on sloped installations. Pressure is to be between 25 and 40 psi. Pressure regulators/pressure compensators are located at the manifold of each zone where varying topographies exist. Pressure compensating emitters must be used on sloped installations.
8. Return manifold is required to drain back to the septic tank.
9. Timed dosing is required. Timed or event counted backflushing of the filter is required.
10. Filters, flush valves, and pressure gauge may be placed in a wasteflow headworks (between pump chamber and drip field). Each component is required to be insulated to prevent freezing.
11. System must be designed by an engineer.

DRIP DISTRIBUTION SYSTEM (Cont'd)

Construction.

1. No wet weather installation. Excavation and grading are to be completed before installation of the subsurface drip system. Drip systems may not be installed in unsettled fill material.
2. No construction activity or heavy equipment may be operated on the drainfield area other than minimum to install the drip system. Do not park or store materials on drainfield area.
3. Horizontal spacing between drip lines shall be as specified and installed at the depth specified. Note for freezing conditions: the bottom drip line must be higher than the supply and return line elevation at the dosing tank.
4. All PVC pipe and fittings shall be PVC sch 40 type 1 rated for pressure applications. All glued joints shall be cleaned and primed with purple (dyed) PVC primer prior to being glued.
5. All cutting of PVC pipe, flexible PVC and/or drip tubing shall be accomplished with pipe cutters. Sawing of PVC, flexible PVC and/or drip tubing shall be followed by cleaning all shavings or sawing shall not be allowed.
6. All open PVC pipes, flexible PVC and/or drip tubing in the work area shall have the ends covered with duct tape during storage and construction to prevent construction debris and insects from entering the pipe. Prior to gluing all glue joints shall be inspected for and cleared of construction debris.
7. Dig the return header ditch along a line marked on the ground and back to the septic tank. Start the return header at the farthest end from the dosing tank. The return line must slope back to the treatment tank or septic tank.
8. Prior to start up of the drip distribution system the air release valves shall be removed and each zone in the system shall be flushed as follows:
   A. Using an appropriate length of flexible PVC pipe with a male fitting attached to the air release connection to direct the flushing away from the construction area,
   B. Flush the zone with a volume of water (clean water to be provided by contractor) equal to 1.5 times the volume of the pipes from the central unit to the air release valve or the equivalent of five minutes of flushing,
   C. Repeat this procedure for each zone (the flushing of the system is accomplished by manual override of the control panel by the manufacturer or engineer.)
9. If existing septic tanks are to be used, they shall be pumped out by a commercial septic tank pumper, checked for leakage or other problems, and replaced if necessary. After the tank is emptied, the tank shall be rinsed, pumped, and refilled with clean water. Debris in the septic tank shall be kept to a minimum since it could clog the disk filters during startup. (Disk filters are not backflushed during startup as any clogging could cause incorrect rate of flow readings for the controller.)
10. Once completed, drainfield area for shallow installations (less than 12 inches) are to be capped with 6-8 inches of clean soil.

Inspection.

1. System must be inspected by an engineer.
2. Turn on pump and check pressure at the air vacuum breaker. Pressure should be between 15 and 45 PSI.
3. Check system for leaks; record flow measurements and pressure readings at start up.

Example: Manufacturer Suggested Design

1. Determine square feet needed for the drip distribution system. Wastewater flow in GPD is divided by the soil application rate (based on the soil classification from an on-site evaluation). The result is the ft^2 needed for the system.

   Example: three-bedroom home in C-2 soils.
   250 GPD/0.2 gal/ft^2 = 1250 ft^2

2. The system design is to use an application rate of 2 ft^2 per foot of drip line. Divide the required ft^2 by the drip line application rate (2 ft^2/ft) to determine the length of drip line needed for the system.

   1250 ft^2 / 2ft^2/ft = 625 ft of drip line.

3. Determine the size of pump based on GPM (step 3) and total head (step 4) necessary to deliver dose to system. Determine pumping rate by finding the total number of emitters and multiplying by the flow rate per emitter (1.32 gal/hr/emitter at 20 psi). Adjust output to GPM

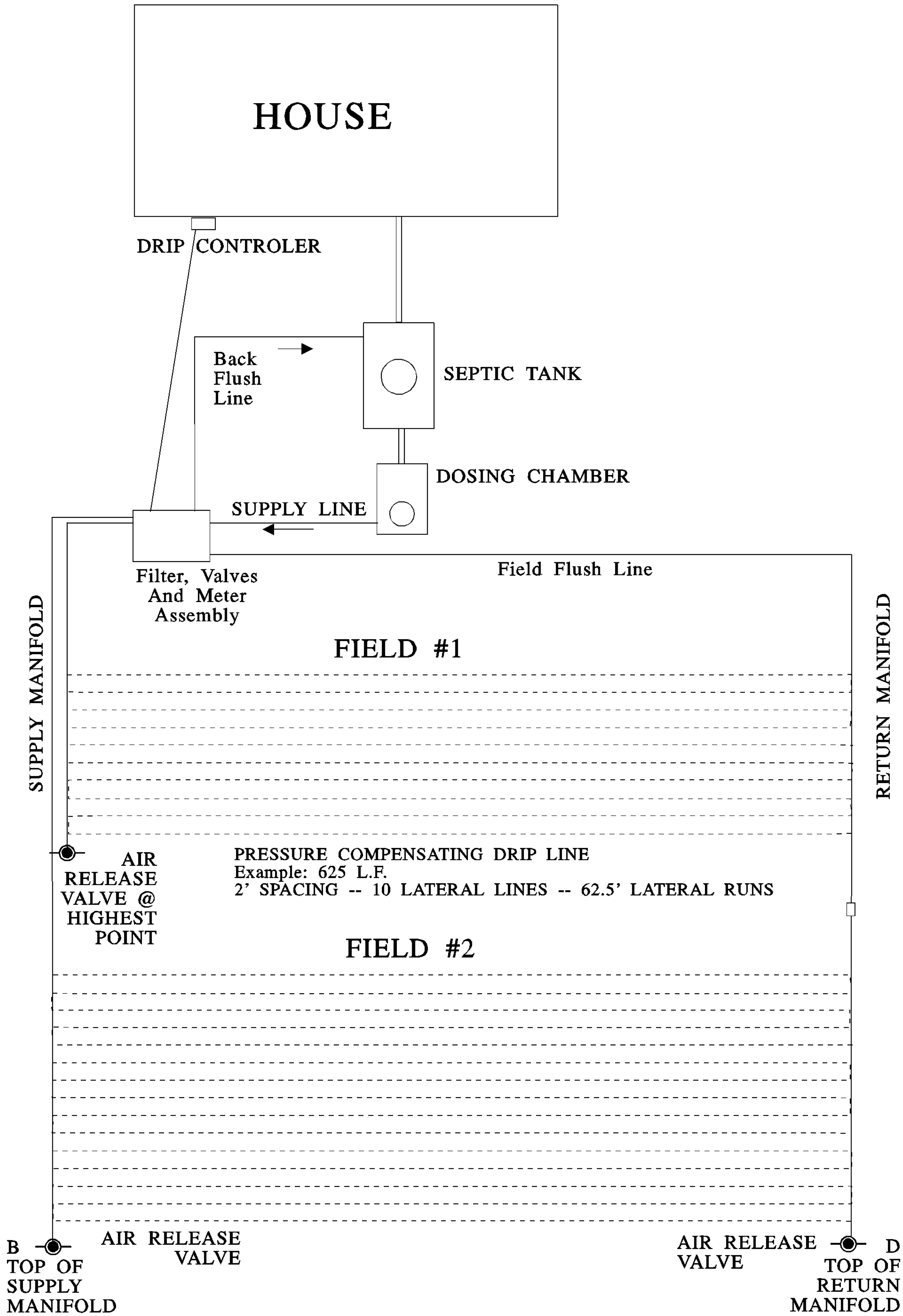
   625 ft / 2 emitters/ft = 312.5 use 315 emitters
   315 emitters x 1.32 g/hr/emitter = 415.8 gal/hr
   415.8 gal/hr / 60min/hr = 6.93 GPM or 7GPM

4. Determine feet of head. Multiply the system design pressure (20 psi is standard, but values can be between 10 and 60 psi dependant upon drip line used) by 2.31 ft/psi to get head required to pump against.

   20 psi x 2.31ft/psi = 46.2 ft of head. Add in the frictional head loss from piping.

5. Select a pump. Pump selected must achieve a minimum of 7 GPM at 46.2 ft of head.

DRIP DISTRIBUTION SYSTEM



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Berkowitz, S.J. and J.R. Harman. 1994. Computer program for evaluating the hydraulic design of subsurface wastewater drip irrigation system pipe networks. Pg. 475-484. In On-site Wastewater Treatment Proceedings of the seventh International Symposium on Individual and Small community Sewage Systems. ASAE Public. 12-94. ASAE, St. Joseph, MI.

Berkowiz, S. 1999. Subsurface drip wastewater systems-North Carolina's regulation and experience. Pg. 127-140. In Proceedings of the 10th northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 20-21, 1999 Seattle Washington.

Sinclair, T.A., B. Rubin and R.J. Otis. 1999. Utilizing drip irrigation technology for on-site wastewater treatment. Pg. 141-142. In Proceedings of the 10th northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 20-21, 1999 Seattle Washington.

Ruskin, R. 1999. Are soil application rates with subsurface drip disposal dependant upon effluent quality? Pg. 143-152. In Proceedings of the 10th northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 20-21, 1999 Seattle Washington.

Persyn, R., B. Lesikar and I. Jnad. 1999. Evaluating soil properties in subsurface drip distribution systems. Pg. 153-170. In Proceedings of the 10th northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 20-21, 1999 Seattle Washington.

Rubin, R.A. and J.R. Harman. 1997. Design considerations for drip disposal wastewater management systems. Pg. 349-360. In Proceedings of the 9th northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition, September 22-23, 1997, Seattle Washington.
Bohrer, R.M. and J.C. Converse. 2001. Soil treatment performance and cold weather operations

of drip distribution systems. Pg. 561-583. In On-site Wastewater Treatment Proceedings of the Ninth Symposium on Individual and Small community Sewage Systems. ASAE Publication 701P0101. ASAE, St. Joseph, MI.

Studied 6 systems; 3 STE, 1 RGF and 2 ATUs. Two year study in Wisconsin. Conclusions: "With proper design and installation, drip distribution systems are an excellent alternative system for wastewater dispersal in cold climates."

Application rates were 0.54 gpd/ft², 0.51 gpd/ft², loamy sand.

Site	Eff qual	Gpd	Gpd/ft	Gpd/ft²	Soil type
Jackson	RGF	121	1.2	0.6	Loamy fine sand
Monroe	ATU	6200	24	0.6	Loamy sand over s
Rock	ATU	200	1.8	0.6	S loam over s clay
Barron	STE	6000	9.1	0.51	Loamy sand
Zone 3	STE		4.8	0.26	Loamy sand
Zone 4	STE		13	0.75	Loamy sand
Zone 5	STE		4.8	0.26	Loamy sand
Fond du Lac	STE	122 (m. sand mound)	1.1 1.1	0.08 (cl) 0.23 (s)	Silt loam/ s clay l/ massive clay
Wood	STE	2500des (750act)	3.4	0.11	Loam over clay

Berkowitz, S.J. 2001. Hydraulic performance of subsurface wastewater drip systems. Pg 584-593. In On-site Wastewater Treatment Proceedings of the Ninth Symposium on Individual and Small community Sewage Systems. ASAE Publication 701P0101. ASAE, St. Joseph, MI.

North Carolina study of a mobile home park and 4 schools. Emitters are either pressure compensating (PC) or pressure dependent (PD), uses a 100-u disk filter.

Site	Eff qual	Gpd	Gpd/ft	Gpd/ft²	Soil type
Lake Wheeler	STE	13,000	0.3	0.15	III-IV C1-C2
Cedar Grove	STE	4,000	0.38	0.1	II-III B1-C1
Pactolus	STE	8,400	1.09	0.27	I-III A-C1
Edward Best	S. Filter	6,000	0.16	0.08	IV C2
Vaughn	S. Filter	4,000	0.16	0.08	IV C2

Sievers, D.M. and R.J. Miles. 2001. Performance of three irrigation disposal systems in a karst sinkhole plain. Pg 594-601. In On-site Wastewater Treatment Proceedings of the Ninth Symposium on Individual and Small community Sewage Systems. ASAE Publication 701P0101. ASAE, St. Joseph, MI.

Study of 3 systems in Columbia Mo. With testing to determine N attenuation.

Site	Eff qual	Gpd	Gal/ft²	Gal/ft²	Soil type
4 bed house	STE	350	0.04 actual	0.13 design	Silty Clay Loam
4 bed house	ATU	350	0.152 actual	0.41 design	Silty Clay Loam
4 bed house	ATU	350	0.20 actual	0.41 design	Silty Clay Loam

Hayers, J.G. Jr. 2001. Expanding the applications of micro-irrigation "drip" treatment and disposal systems in Delaware. Pg 602-606. In On-site Wastewater Treatment Proceedings of the Ninth Symposium on Individual and Small community Sewage Systems. ASAE Publication 701P0101. ASAE, St. Joseph, MI.

Drip line 15-20 cm deep, emitter spacing 60 cm and 60 cm on center for lines. Uses ATUs and has a 45 cm depth to ground water. Flow meter in drip control unit. 100-yr rain event with flooded drainfield area for 3 days. When ground dried out systems worked fine. Course sands for systems installation, 3 STE and 1 ATU. Study looked at GW impacts and reduced sep distance to GW.

Burton, D.J., F.H. Harned, B.J. Lesidar, J.F. Prochaska, and R.J. Suchecki. 2001. Design principals for drip irrigation disposal of highly treated on-site wastewater effluent. Pg 607-617. In On-site Wastewater Treatment Proceedings of the Ninth Symposium on Individual and Small community Sewage Systems. ASAE Publication 701P0101. ASAE, St. Joseph, MI.

Developed design guide for secondary effluent w/ <20 mg/l CBOD and <20mg/l TSS and < 1500 GPD. Design guide is not for septic tank effluent. Authors are from Texas.

Loading Rate (Gal/ft^2/day)		Soil Classification	
Maximum	Recommended	USDA	TGM
1.0	0.50	I	A-B
0.30	0.25	II	C1
0.20	0.15	III	C1-C2
0.10	0.05	IV	Unsuitable

Recommendations for cold weather installations: Install drip lines 12-18 inches below grade or below frost line. Use timed dosing design for nearly continuous flow with drainback of distribution manifold to dosing chamber. Use a vegetative or other thermal (soil or snow fence) cover. (Note the drainback design was not discussed by Bohrer and Converse, 2001).